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Experience, innovations, potential

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ESCO in Danish municipalities: Experience, innovations, potential

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Abstract

This paper presents current research on Danish municipalities' use of ESCOs (Energy Service Companies) as a way to improve the standard of public buildings and to increase energy efficiency. ESCO has for many years been known as a way to realise energy efficiency in buildings. In Denmark, it has mainly been used in the industry so far, but in recent years more and more municipalities have taken up ESCO initiatives, in order to retrofit existing public buildings, and to make them more energy efficient. ESCO is in many ways a new way of collaboration for Danish municipalities, and therefore include many challenges. At the moment 15 municipalities (of 98 municipalities in Denmark) are involved in ESCO contracting.

The purpose of this paper is to discuss the various experience gained so far by municipalities, and to discuss the drivers and barriers behind the development. We also discuss whether ESCO might lead to new ways of working with energy efficiency in public buildings, and possibly generate innovation in the public sector. There is already some evidence from the municipalities that on-going ESCO projects have led to new ambitious initiatives and plans for energy savings in municipalities

ESCOs have received much attention in different Danish energy-efficiency policies, where ESCOs are often described as a promising way to achieve energy savings in existing housing and to overcome barriers encountered by other attempts at energy savings. Instead of assessing ESCO only on the amount of energy saved, we suggest that ESCO contracting could potentially become a learning process for municipalities, enabling and encourage public administrations to work in other ways with public-private and public-public partnerships on energy savings. Theoretically, it will compare the Danish development with international ESCO experience as well as refer to public innovation literature. Combined with empirical case studies on ESCO contracting, we discuss factors and conditions that influence decisions on ESCO, the flexibility of ESCO contracts and whether it implies an innovative process, or as a possible contrast, a 'once in a lifetime-experience' for municipalities.

The paper is based on an on-going research project, which aims to identify the opportunities and barriers of applying ESCO in the Danish housing market. The results are therefore preliminary.

Introduction

Background

In a recent survey on the European ESCO market, it has been noted that the situation in Denmark has changed over the last years, primarily due a growth in municipal ESCO projects (Marino et al., 2010). In 2008 a handful of municipalities had started ESCO projects in municipal buildings, whereas in the beginning of 2011, 15 municipalities (of 98 municipalities in Denmark) have signed ESCO contracts or are preparing to do so. The experience gained by using ESCO are therefore still very new, and debates are still going on between municipalities on viewpoints and the pros and cons of ESCO contracting. Municipalities can be seen as locomotives for ESCO contracting in Denmark, and the municipalities' experience with ESCO is likely to influence the rest of the ESCO market. Therefore, it is interesting to look at the experience with municipal ESCOs so far, and to understand the drivers and barriers for the development in the municipalities.

As a general definition, an energy service company (ESCO) is a company that is engaged in developing, installing and financing comprehensive, performance-based projects (Vine, 2005). In an ESCO contract, the ESCO takes the risk for achieving defined energy savings, instead of the client (e.g. a building owner), making investments in energy savings measures more calculable and thereby attractive for clients. Practical definitions of ESCO however vary across Europe (Bertoldi et al., 2007). In the ESCO model used in Danish municipalities, the client takes the investment (i.e. no private or third-party financing), and the ESCO implements the agreed energy retrofitting initiatives, and guarantees a certain level of energy savings. 'Energy Performance Contracting' (EPC) would therefore be a more correct term to use, like in Sweden where similar types of contracts are used by the municipalities (Forsberg et al., 2007). As 'ESCO' however is used widely in a Danish context, the paper will also use this term. In the Danish context, 'ESCO' is used for the companies as well as for the types of agreements between the client and the provider. The agreements are generally and in this paper referred to as 'ESCO contract, ESCO agreement', 'ESCO collaboration' or as 'ESCO partnership'.

Purpose and methodology of the study

Our aim with the study is to identify drivers and barriers amongst the municipalities for using ESCO. This includes a question of whether the expectations that the municipality had to the ESCO have been met so far, and whether unexpected benefits, spin-off's or organisational innovations appeared as a result of the process. We therefore also discuss whether ESCO contracting represents new ways of working with energy-efficient retrofitting of buildings, for the municipalities.

Another interesting question in relation to understanding the market diffusion of ESCO is the flexibility of the ESCO concept; does it allow different contexts (political, financial, organisational, technical), and how innovative are the municipalities in adapting ESCOs to the municipal context? For instance, ESCO contracting might inspire the municipal facilities management-function (FM) to create innovation and new roles for the FM section, for instance in order to disseminate their ESCO experience to private house owners in the municipality. In the understanding of the context and the possible learning taking place, we therefore also focus on the municipal FM function, its organisation and its collaboration with other departments.

The paper is based on an on-going research project aiming to identify the potential and barriers to applying ESCO contracting in the Danish housing market; the results are therefore preliminary. The paper presents findings from the initial phases of the project including a survey of existing Danish ESCO initiatives, literature studies of ESCO experience as well as a case study on one of the first ESCO contracting projects in a Danish municipality. Parts of the study are based on recent Danish and international surveys and literature studies on ESCOs and ESCO contracting. Other parts are based on interviews with eight municipalities about their motivation and experience with ESCO contracting. They were carried out as semi-structured interviews with leading officers in the municipal administration, based on an interview guide.

The institutional framework for ESCO in Denmark

On a national level, ESCOs have been promoted and encouraged in different policy papers on energy savings in the existing building stock. It is seen as an essential input for reaching international as well as national goals on energy savings and CO₂ reductions (including the European 20-20-20 goals); 40% of the energy consumed on a national level is used to heat buildings, and as several surveys have documented, there is a massive energy saving potential in energy retrofitting of the existing building stock, but it has also been difficult to implement energy saving measures in the existing building stock.

As in other countries, the EU Directive on the Energy Performance of Buildings has been a driver for governments to encourage development of energy services (Bertoldi et al., 2007). As a first step, the Danish Government signed a political agreement in 2005 as part of the Directive, where the main objective was statutory energy labelling of both public and private buildings. To encourage energy savings, the municipalities were allowed to take loans for the renovation, if they included the suggestions for energy improvements outlined in the energy label for the buildings, as well as other specified energy reducing initiatives. Normally, municipalities are not allowed to start building projects by taking up loans, as a way for the state to keep municipal taxes under control. This also includes typical initiatives in an ESCO contract. Municipal loans typically have low interest rates and therefore third-party financing has not been interesting for the Danish municipalities in ESCO contracting. The guaranteed savings in the ESCO contract will cover the mortgages on the loan, and the municipality can therefore complete energy renovations as expense neutral. This is the main 'carrot' for the municipalities to engage in ESCO projects, and thus energy labelling of municipal buildings plays an important role. To strengthen this, an agreement from 2007 between Local Government Denmark and the government settled that all initiatives for energy efficiency with low payback time (< five years) outlined in the energy label on public buildings should be completed within four years.

Experience shows that besides formal regulations, institutional capacity building can be an important tool for developing an ESCO market (Bertoldi et al., 2007), as for instance in Austria and Sweden. In Sweden, the formation of an Energy Performance Contracting (EPC) forum was formed in 2004 with the aim of creating contact between public building owners, consultants and ESCO companies, and communicating experience, as well as collecting and communicating experience gained from EPC contracting. Evaluations have later shown that the EPC forum has had a central role for the development of EPC in Sweden, by informing different actors about EPC and creating confidence in the concept (Forsberg et al., 2007).

In Denmark, such institutional capacity building has not taken place as a coordinated effort, but different initiatives have contributed to it. Besides a general promotion as a tool for energy reductions in buildings, it has also been promoted by the Ministry of the Interior and Social Affairs as a way to increase public-private partnerships (PPP). This effort includes workshops with private and public partners to promote networks and to disseminate of knowledge, support to municipalities that consider ESCO contracting, action plans for public-private collaboration, collection of knowledge and 'best practice' etc. On another track, the 'Centre for Energy Savings', a publicly financed unit with the aim of promoting energy savings in general, has promoted ESCO, by disseminating knowledge of ESCO, monitoring development and experience in Danish municipalities, informed on 'best practice' etc. Finally, the 'Energy Research Programme' has initiated a number of R&D projects on ESCO, for instance on describing the elements in ESCO, experience from other countries, developing a standard contract on ESCO etc. Compared with the Swedish strategy, which had a much stronger international perspective, the Danish strategy has been less internationally oriented. The primary international flavour has been the compilation of international experience (primarily Sweden, Austria and US), and actors' own experience from abroad (primarily Sweden). The formation of a Swedish forum on ESCO has apparently been given a more continuous platform for exchange of knowledge, whereas the Danish initiatives have been of a shorter duration (for instance workshops between ministries, municipalities, ESCO consultants, and ESCO suppliers).

Moreover, as a contrast to the Swedish development, the climate agenda has been an important motivation for many municipalities, especially voluntary agreements. One is the 'Climate Municipality', a voluntary agreement between the municipality and the Danish Nature Saving Trust, which obliges the municipality to reduce energy consumption by 2% per year in the municipality as a whole, i.e. not just the municipal administration, but the municipality as a defined area, including private building owners. This includes not

just energy for heating of buildings but all kinds of energy, including supply, transport, electricity etc. At the moment, about 2/3 of all Danish municipalities have signed such an agreement. Another voluntary agreement is the 'Curb-cutting agreement' with the Centre for Energy Savings in which the municipality promises to reduce electricity consumption in public buildings by 2% per year.

ESCO in Danish Municipalities: An overview

Table 1 lists the ten Danish municipalities that have signed an ESCO contract, including the main characteristics of the contract. In the following we briefly describe the development, the actors and the type of projects.

Table 1. Status for ESCO contracting in Danish municipalities as per 7 January 2011. Source: Danish Energy Savings Trust and interviews with municipalities. Besides these ten municipalities, another five municipalities are preparing ESCO contracts.

Municipality	Volume in ESCO contract	ESCO supplier	Contract period	Investment, €/ m ²	Guaranteed Savings	Improvements of:
Kalundborg	10 buildings 30,000 m ²	Schneider Electric	2009-2021	89	21%	Technical system and installations
Middelfart	100 buildings 190,000 m ²	Schneider Electric	2008-2015	31	20%	Installations and indoor environment in all municipal buildings and re-insulation of a few buildings. Energy labelling of all buildings
København	27 buildings 68,000 m ²	DONG	2009-2018	24	n.a.	Energy savings and energy labelling of properties in the nursing facility "De Gamles By"
Gribskov	100 buildings 190,000 m ²	Schneider Electric	2009-2016	18	17%	Energy savings through better management and technical improvements of buildings
Vallensbæk	20 buildings 93,000 m ²	Dansk Energi Management	2009-2019	50	31%	Technical systems and building envelope for the municipal buildings. Energy labelling
Kerteminde	48 buildings 117,000 m ²	Schneider Electric	2009-2019	51	n.a.	Technical systems and building envelope
Høje Taastrup	270 buildings 270,000 m ²	Schneider Electric	2009-2021	20	18%	Technical systems, indoor environment in all municipal buildings and better heat regulation
Halsnæs	120 buildings 175.884 m ²	YIT	2009-2021	70	30%	Installations and building envelope as well as incentives for users to savings
Greve	11 schools 100,000 m ²	Siemens a/s	2009-2016	22	16-19%	Better heat regulation, ventilation and lighting in schools and kinder gardens
Sorø	65 buildings 133,000 m ²	Schneider Electric	-	44	n.a.	Energy systems and building envelope for all municipal buildings

Different stages

The municipalities are at different stages; some are in the initial phase of preparing a tender, whereas others have finished retrofitting and have entered the operational phase. The first Danish municipality to sign an ESCO contract was Kalundborg in 2006. Due to the municipal structure reform in 2007, the collaboration was delayed, but re-started in 2009. Meanwhile, two other municipalities, Gribskov and Middelfart, had started their ESCO projects. These three municipalities formed their own 'ESCO network', with close collaboration and knowledge-sharing in the initial phases, leading to several ideas on how the ESCO concept could be disseminated to other municipalities. In 2009 and 2010, several other municipalities (at the moment 15 municipalities) have signed ESCO contracts. The projects are typically divided into three stages: Energy audit (incl. energy labelling), implementation and operation. Typically, the contracts give the municipality the option to cancel the collaboration after each stage. This often gives the municipal decision-makers more confidence to sign the contract, as a collaboration lasting 10-12 years may be difficult to predict, especially when municipalities rarely know the ESCO supplier beforehand.

Market actors

In contrast to many other European countries, where utilities have been the main providers of ESCO services (Bertoldi et al., 2007), the Danish market has been dominated by private companies that gained experiences from ESCO contracting in neighbouring countries, primarily Sweden. It should be noted that a

single ESCO supplier (Schneider Electric) has a large share of the market (approx. half of all contracts so far), although several other ESCO suppliers have been present on the market for some time. Several consulting companies have developed competences on ESCO, and taken on the role of consultants for the municipalities on designing the tender and the contract on the ESCO collaboration. The utilities have not played a large role in developing ESCOs in the municipalities, but have instead focused more on developing ESCO-like concepts for private home owners (including the so-called 'ESCO light').

Type of projects

There is a large variation in the number of buildings included in the ESCO contracts (from 10 to 270), with an average of 60 buildings (or 114.000 m²) per contract. Moreover the size of investments in the buildings varies, from 18 €/ m² to 89 €/ m², with an average of 37 €/m². These figures are comparable with those of Sweden, where the average building volume for EPC contracts is 140,000 m², and investments typically are around 35 €/m² (Wormslev, 2008). In all cases the contracts are based on the guarantee model; the municipalities finance the retrofitting, and the ESCO guarantees a certain energy reduction, based on the retrofitting initiatives defined in the contract. If the reduction is not reached, the ESCO will pay the municipality the difference. If more than the guaranteed savings are reached, the municipality and the ESCO will share the surplus according to conditions defined in the contract. The guaranteed savings are typically • 20% of the existing energy consumption. Improvements on regulation and control (for instance introducing CTS, and equipment for steering and monitoring) that allow energy use that often have a short payback period (small costs and high energy savings), whereas improvements that include the physical improvements of the building (e.g. new windows, insulation or other improvements of the building envelope) have longer payback periods and therefore are often kept out of the contracts. It is, however, possible to define a combination of regulation improvements and building improvements, which some municipalities have already done. These differences are partly reflected in the various guarantees for energy savings in the contracts, ranging from 16-17% to 30-31% reduction of the energy budget in the municipal buildings, with an average of 22%.

Drivers and barriers for using ESCO

Compared with the high expectations to the ESCO concept as a tool for providing more energy-efficient retrofitting of public buildings, the limited number of municipalities using ESCO is often described as 'disappointing' and 'a failure for the government'. In contrast, others describe the ESCO market as 'coming and 'evolving', as many municipalities are interested in the concept, and the number of municipalities signing ESCO contracts is increasing. This illustrates different viewpoints on the development, and that there are ongoing discussions amongst Danish municipalities about the possible benefits of using ESCO projects. In the following, we take up some of the potential drivers and barriers discussed in the current debate on ESCO, as well as drivers and barriers taken from the international literature on ESCO, and discuss this in relation to observations made from interviews and studies on municipalities engaged in ESCO contracting.

Energy labelling

As mentioned in the Introduction, energy labelling of municipal buildings is a cornerstone for promoting ESCO contracting. However, many municipalities have not completed the energy labelling of their buildings yet. A survey from December 2009 showed that at that time only 30% of municipalities had completed the energy labelling (KL, 2010). Therefore a central motivation for completing the retrofitting of the buildings has been missing; the municipalities have less overview of the buildings, their energy consumption and their savings potential, and also have no access to take up loans for financing the retrofitting. A survey on ESCOs in Danish municipalities showed that many municipalities find it hard to find financing for energy savings in buildings (IDA, November 2010), which could be related to the lack of energy labelling. On the other hand, data from the municipalities show that energy labelling of the municipal building portfolio is included in many ESCO contracts. Thus, the demand for energy labelling of municipal buildings might actually work as a driver for ESCOs, although not in the intended way. The outcome of the energy labelling can also be argued; the labelling system has been heavily criticised for not delivering value for money and some municipalities share this viewpoint. *"We started labelling our buildings four years ago, and what did we get for the money? We learned that we did not reduce the energy just by labelling the buildings"* (officer, municipality of Høje Taastrup). Nevertheless, this led to considerations on other ways to save energy, and this is where they started to take an interest in ESCO. Other municipalities have similar stories; energy labelling is a mandatory

first step to learn about energy savings in municipal buildings, and in this exercise ESCO contracting seems to be a possibility.

Financing

A main reason for the municipality to enter an ESCO contract is the possibility of financing the improvements of many buildings over a short time. If the municipality should finance the renovations traditionally, there would only be room for gradual improvements, due to municipal budget limitations. In an ESCO project the municipality is allowed to take out loans for the entire project at the same time, as the ESCO supplier guarantees the savings. For instance, one municipality states that it could have had 1 million Dkr. per year (130,000 €) over the coming years, but the ESCO contract gives them 68 million Dkr. (9 million €). For some municipalities it might be the only reason, as they see themselves as capable of completing the building improvements themselves. *"Naturally, if we had had the 70 million. Dkr. ourselves, we would have done it, because we would have had the savings in cash afterwards"* (officer, municipality of Høje Taastrup).

The counter argument to the attractive financing options is that *'ESCO is too expensive'*. A survey from 2010 showed that the main reason for municipalities not to enter ESCO contracting is a better economy by doing it yourself, i.e. that the ESCO arrangement is too expensive; 82% of the municipal directors claims that in terms of economy it is better to finance the improvements in other ways than as an ESCO contract. Nevertheless, such financing is difficult to find, and it is an open question what the alternative to ESCO financing there is. One possibility, as indicated in the quote above, is municipal equity, another is funding it out of the ordinary budget, but this would be possible only for major municipalities.

The question of ESCO's being expensive is not a question raised by municipalities that have already signed a contract. The municipalities accept that the ESCO suppliers earn money on the contract, but the main argument is that the ESCO allows an instant improvement to take place. Another aspect concerns the administrative capacity to carry out the building improvements. This is usually not mentioned in the discussion of the pros and cons on ESCO, but it is very important for especially the smaller municipalities that do not have the staff to complete such a large task. As one municipality explains: *"It would take a long time to establish an organisation that could manage an assignment like that, and we would have to start to downsize it almost as soon as we had started"* (officer, municipality of Vallensbæk). In a similar way, other municipalities state, that it would have been completely impossible to carry out such a task with their staff, which is usually very small. Keeping this task in-house therefore, for many municipalities, require a major re-organisation, which would in many cases be unrealistic.

Political commitment

Surveys on municipal engagement in ESCO have indicated that municipalities that have signed up as 'Climate Municipality' are more interested in ESCO and have a more positive attitude towards it than other municipalities. Our interviews indicate that the 'Climate Municipality' as well as the 'Curb-cutter' deal present great challenges for the municipalities, but also a political acceptance to pursue energy savings. Reducing energy consumption by 2% p.a. is a challenge that requires extraordinary initiatives: *"We could save 2% a couple of years, using our own municipal finance. But after that it would become difficult. 2% per year is actually very ambitious...but then one of our consultants mentioned ESCO as an opportunity"* (officer, municipality of Halsnæs). On the other hand, there are also examples of using ESCO in municipalities that are not politically very engaged in the climate agenda. Here, ESCO is seen as a way of being able to do something on energy retrofitting, without having to engage very much in it. *"If you had politicians that were really engaged, then you were already rolling, and you just needed to go on, instead of starting from scratch. But in our case it is better with an ESCO project, then you can see what you get for your money"* (officer, municipality of Kerteminde).

Energy-saving potential of buildings

In some municipalities the potential for energy savings is too small for an ESCO due to well-maintained buildings. In general, however, Danish public buildings have a large back-log on maintenance, and a survey found that 25% of public managers assess the energy standard of municipal buildings as 'low' or 'very low' (IDA, 2010), which suggests a large potential for the retrofitting of the municipal buildings. The contracts from the present ESCO municipalities show that there is room for flexibility in defining how poor standard of the buildings has to be to be included in the ESCO contract. In one municipality, the preparations for ESCO contracting showed that the buildings were in better shape than expected, which made it difficult to find the 15% energy reductions that were the aim. Therefore, the municipality had to *'climb up the tree for the high-*

hanging fruits', for instance by including solar panels on the town hall in the contract. The city council had to accept that the payback period was raised from 15 to 20 years, which according to the officer was a great challenge.

If only the buildings with the greatest potential are included, and only simple improvements are made, it is possible to reduce the payback time and reduce investments. If, however, more buildings are included and ambitions are raised regarding building improvements, payback time will rise, and so will the investments. The benefit is that more buildings are included, and the total amount of energy savings will increase. Therefore many municipal officers argue that once the politicians have accepted the ESCO strategy, as many buildings as possible should be included in the contract. This will allow not only energy reductions to be reached, but it would potentially improve the indoor climate and reduce the maintenance backlog. Therefore many municipalities try to get as many buildings as possible included, so that the initiatives with short payback time will 'finance' initiatives with long payback times. This is a difficult balance that the municipalities have to find, as expressed by this officer in Sorø: *"...it takes many improvements with short payback periods to enable inclusion of windows, walls, doors and all the other things with a long payback period."* (officer, municipality of Sorø).

It is not an easy task to decide how the tender should be structured, and the concept might be changed along the way, as the officers learn about the possibilities and get input from discussions with other stakeholders in the municipality. As an example, one municipality started out with a conservative aim of 15% savings that they were certain that they could find. However other stakeholders raised the question, why the goals were not more ambitious, if some ESCO supplier said they could save for instance 30%. This led to a new project description, with more ambitious goals, including that 15% of the reductions should come from renewable energy, and 35% from improvements of the building envelope. This illustrates that in the course of the process of defining the project, there is room for flexibility and for being innovative with regard to the types of buildings included. Defining the potential is therefore not a simple question, but depends of the strategy and the political commitment in the municipality.

Keeping competences in-house

One of the main reasons for the reluctant attitude amongst some municipalities, as also mentioned by Bertoldi et al., (2007), is the alternatives to ESCO regarding energy retrofitting. One of the main arguments against ESCO is that it is more profitable for the municipality to complete the energy-efficient retrofitting themselves, as an in-house project (IDA, 2010; NRGi, 2009) and that they are sceptical about the financing mechanisms in the ESCO arrangement. Many also argue that if the municipality itself completes the energy-retrofitting, competences will stay in-house. *"The companies offering ESCO-contracts with the municipalities want to get a hold on the long end, and we are not interested in that"* (quote from a leader of the building section in a municipality who has rejected an ESCO collaboration). As an alternative, the municipality might finance a systematic retrofitting with its own resources, they might start a strategy with private companies on reducing energy demand in the municipal buildings, or other types of arrangements. The argument for keeping competences in-house might also reflect more ideological views on public-private partnerships. However, in practice the option for an in-house strategy is limited to the larger municipalities with bigger staffs, more competences and better economic resources. As our interviews also show, for smaller municipalities this is practically impossible.

Lack of knowledge

An often mentioned barrier in a European context is lack of information and understanding about ESCO (Bertoldi et al., 2007). These are, however, rarely mentioned as a barrier in the Danish debate. Different surveys have demonstrated that very few municipalities mention lack of knowledge of ESCO as a reason for not using ESCO (IDA, 2010; NRGi, 2010). There has been no evaluation of the Danish efforts to promote ESCO on a national level and whether this has motivated the municipalities. In our interviews with the municipalities, no one mentioned the national supportive initiatives, but all referred to other reasons and stories for being involved. This includes information and knowledge about ESCO from different informal sources, for instance talking with other municipalities, meetings with ESCO suppliers, from the media and others sources. Some Danish municipalities have also visited Swedish and German municipalities to learn from their experience. At the time when the Danish market emerged in 2007, about 20 Swedish municipalities had already signed an ESCO contract. Many ESCO providers (Schneider electric, Siemens, YIT etc.) have built their competences and gained experience on the Swedish market, and applied it on the

Danish market. This has given Danish clients (municipalities) more confidence in using the ESCO model, as the providers could refer to cases from similar municipalities in Sweden.

Transaction costs

Transaction costs is another well-known barrier for ESCO (Bertoldi et al., 2007) and PPP in general. If transaction costs rise, e.g. related to due diligence or to contract formulation, the volume of the contract also needs to be proportionally higher to maintain the net benefit. The minimum volume for an ESCO project in the Danish context is assessed to 10-15 million Dkr. (1.5-2 million €) (IDA, 2010). This has rarely been discussed as a problem in the Danish ESCO debate. One reason for this might be that the municipal reform in 2007 reduced the number of municipalities in Denmark from 279 to 98, increasing the average size of a municipality to approx. 50,000 inhabitants, and also increasing the municipal building stock. This makes it easier for the municipalities to send a large volume of buildings to tender, thereby reducing the transaction costs. The average ESCO project is approx. 5.5 million € in volume, and therefore well beyond the critical limit of 2 million €. Other types of transaction costs involve the legal aspects of the tender and the contract. In a survey, 10% of the technical directors mention the legal challenges of ESCO as a barrier to using ESCO, and 8% mention the process of tender as a reason for not using ESCO. As an example, one municipality in a survey states that *"the legal aspects about the guarantee for energy savings are often complicated and require vast amounts of documentation in order to work"* (IDA, 2010). On a regulatory level, the initiatives to reduce transaction costs have been limited. A standard contract for municipal ESCO's has been developed (Elsparfondens, 2009), but we have no reports on municipalities actually using it. The question of transaction costs was not brought up by any of our informants during the interviews, but the legal challenges were mentioned by many. This especially concerns the tender, where most municipalities use consultants. Especially the limitations of EU tenders that do not allow up-scaling of a project without a new tender were mentioned by several municipalities as an important issue to be aware of.

Analytical perspectives: ESCO and Innovation

As indicated in the sections above, ESCO contracting implies many challenges for the municipalities, which might lead to new ways of working with energy savings in buildings, with end-users, with public-private partnerships or different ways of organising the municipal administration.

A theoretical model of innovation

In order briefly to get an understanding of innovation as a phenomenon, some definitions are appropriate. Van de Ven (1999) defines innovation in general as *"new ideas that are developed and implemented to achieve desired outcomes by people who engage in transactions (relationships) with others in changing institutional and organizational contexts."* (Van de Ven 1999:6). Jean Hartley (2005) defines innovation in the public sector as follows: *"Those changes worth recognizing as innovation should be...new to the organization, be large enough, general enough and durable enough to appreciably affect the operations or character of the organization"* (Moore et al., 1997, p. 276, quoted from Hartley 2005). And finally, Albury defines innovation in the public sector as follows: *"Successful innovation is the creation and implementation of new processes, products, services and methods of delivery which result in significant improvements in outcomes, efficiency, effectiveness or quality"* (Albury 2005: 51).

What the definitions have in common is that innovation is *the creation of new ideas that are developed and implemented in the form of new processes, products, services and methods of delivery, in order to achieve desired outcomes, which, in case of success (!), will result in significant improvements in outcomes, efficiency, effectiveness or quality.*

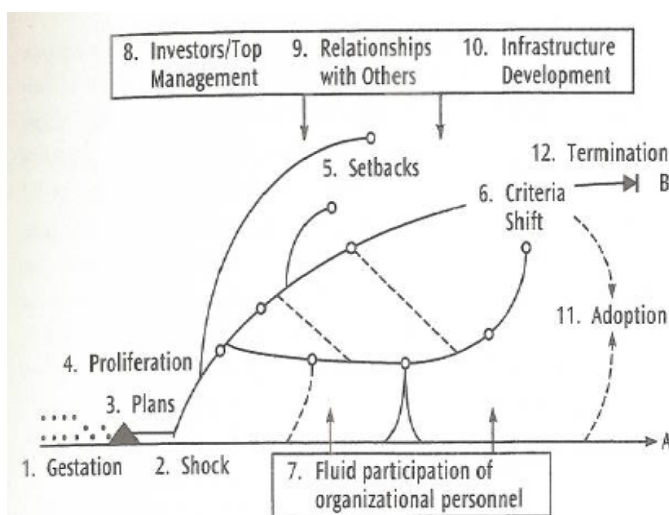


Figure 1. Key components in the innovation journey. Source: Van de Ven, 1999.

However, each of the above authors stresses some central aspects worth mentioning regarding innovation in the public sector. First of all, Van de Ven emphasises the *process* aspect of innovation, which to a very high degree is characterised by confusion, constant change, and uncertainty: “*The journey is an exploration into the unknown process by which novelty emerges. The process is characterized as inherently uncertain and dynamic, and it seemingly follows a random process*” (1999:3). As an illustration of this seemingly random dynamic in innovation enterprises, Van de Ven uses Figure 1. Figure 1 shows us ‘the innovation journey’ from the left to the right. Of importance is the constantly changing environment of the innovation (Figure 1, Nos. 7-10), whereas the development and implementation process is characterised by numerous setbacks but also a proliferation of spin-off opportunities (Figure 1, Nos. 3-12). What the research (mainly from the private sector) demonstrates is that innovation is to a large extent a matter of taking risks; and that the plausibility that the innovation project might fail, is an acknowledged condition in the private sector. So, it seems plausible to suggest that what *drives* the innovation forward according to Van de Ven is the uncertainty and challenges in the innovation process, which forces the participants to be creative in problem solving – but also forces the participants to think in new development and spin-off opportunities, based on the learning generated in the process.

Hartley (2005) stresses the fact that innovation in a public sector context should to some extent be radical in order to distinguish innovation from the usual organisational improvements (see Figure 2). But she also stresses that innovation enterprises in the public sector is often more constrained than in the private sector, in that it also has to yield visible improvements (square 4 in Figure 2). Hartley suggests that the main driver for innovation these days is the dynamic of networked governance. Compared with hierarchy and new public management, network governance steers through networks (Hartley 2005:30). Though Hartley does not define networked governance, she states that network governance revitalises the leadership roles in the public sector, and forces managers and their frontline staff to take on the role of the ‘explorers’ (ibid.: 29). Summarising the growing literature on network governance, Sørensen & Torfing (2005: 15) define network governance as ‘a relatively stable horizontal interfacing of interdependent, but operationally autonomous actors, 2) that interacts and tries to influence each other through negotiations, 3) that takes place in an institutionalised community, 4) that is self-regulating within a framework defined by the political authorities and 5) in a broad sense contributes to public regulation’.

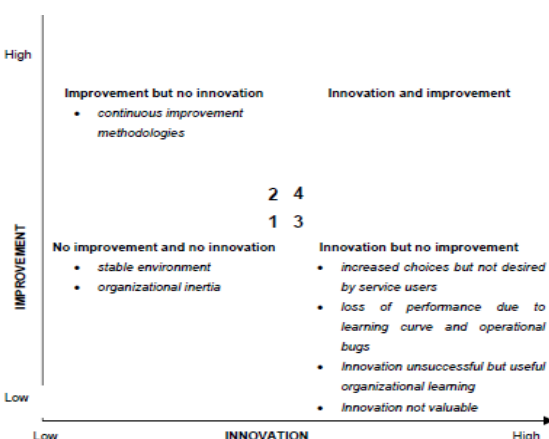


Figure 2. Innovations and improvements. Source: Hartley, 2005.

In other words: network governance forces the public sector to facilitate networks of otherwise un-coupled actors and to design the network as a set-up where these actors can pursue their own interest, and at the same time contribute to the political goal achievement of the public agency. This is both a substantial, organisational and strategic challenge.

Analysis: ESCO innovation in local government?

Innovation theory helps us identify an innovation phenomenon, that is, which dynamics to expect in the innovation process, and what role to play as a local government actor in order to create opportunities for innovation to occur. But it cannot tell us anything about what the desired outcomes are for local governments, how to measure their degree of success on an innovation scale, and what the potential barriers are. Therefore, we need to adapt innovation to an ESCO context in order to establish an innovation scale for ESCOs in Denmark. The experience gained in Denmark hitherto shows us that it is possible to use ESCO as an innovation platform that creates both improvement and innovation (Hartley 2005), but that this is definitely not the standard option for most local governments. We will discuss possible innovative changes in the municipalities' practice and understanding, having applied the ESCO model. However, as Danish municipalities have just recently begun their ESCO collaboration, which typically lasts for a period of 12-15 years, the experience is so far limited. Nevertheless, there is already some evidence from the municipalities

that ongoing ESCO projects have led to new ambitious initiatives and plans for energy saving in the municipality.

When analysing the practices of Danish local governments from an innovation perspective, it is possible to place them on a tentative innovation scale:

Step 1: improvements achieved, but no innovation

Step 2: Improvements achieved as well as small-scale spin-offs, but no innovation

Step 3: Improvements achieved as well as innovation, but no successful innovation

By 'improvements' we mean what the standard desired outcomes are for local governments using ESCO: Reductions in energy consumption, energy labelling of municipal buildings, competences transferred to the end-users – but also regular building renovation. By 'innovation' we mean a challenging, confusing and perhaps spin-off rewarding adaptation process, where local government take on the roles of explorer and network facilitator, which may lead to achieved outcomes and improvements otherwise not possible.

Step 1: improvements 'yes', innovation 'no'

What characterises this group of municipalities at this stage is a routinised project approach to the ESCO enterprise, following this line of reasoning: "ESCO is just one project out of many others, the process has been relatively predictable, nothing unexpected has happened so far, we manage the process by hiring advisors, which more or less guarantees that the ESCO project delivers as planned." As a civil servant stated when asked about surprises in the ESCO project: *"No, nothing really unexpected occurred, everything has been working very smoothly (...) We are a very small municipality with only 16,000 citizens, and we have a high degree of outsourcing"* (officer, municipality of Vallensbæk). This illustrates that for some municipalities, ESCO can appear as another outsourcing service on offer, which is similar to existing municipal practices.

In an innovation perspective, we can argue that municipalities approaching ESCO in this way get what they want, but nothing more. That is, they do not get new development opportunities, and ESCO as a concept does not lead to any reflections on reconsidering 'business-as-usual'. The reason for this might be that all the disturbing and challenging elements (Van de Ven, 1999) have been 'outsourced' to the ESCO and legal advisors. In this way, no capacity building or learning are created within the local government organisation. One barrier for organisational innovation and learning thus turns out to be the outsourcing of challenges to advisors and ESCO, a conclusion that corresponds well with the experience of municipalities that do the energy-retrofitting themselves: they want to keep the project and the capacity-building process 'in-house'. In fact, it seems that one municipality has had this experience: *"We've handed it over to the ESCO, and the ESCO has made a project description. But we have not had the knowledge of the details, I would have liked a little more insight in what they actually did with our buildings. If we were to do it again, we would need to have better insight into what actually needs to be done"* (officer, municipality of Kerteminde). Another barrier to innovation mentioned by one of these municipalities was that they did not have the resources for developing the ESCO as a project any further. Typically, municipal officers are busy taking care of the ESCO and their FM assignments, and have no time or resources for developing innovative concepts. This finding corresponds with Mulgan & Albury (2003), stating that one of the main drivers for innovation in the public sector is access to funding for experiments.

Step 2: Improvements achieved as well as small-scale spin-offs, but no innovation

Municipalities are placed on this step mainly due to their creative and pro-active ways of using ESCO. As an example, the municipality of Halsnæs had been on a study trip to Sweden thereby learning about the importance of communication aspects in user involvement, and about the best way to involve users as well as their wishes for renovation. The Halsnæs municipality is also considering motivating technical staff and users to be ambitious about their 'energy-saving' education by collaborating with a local business school, thereby giving them a certificate. Finally, as a part of the contract with ESCO, Halsnæs has demanded that a fixed percentage of future energy consumption should be covered by green energy, thus resulting in the construction of a solar cell plant. This creativity led to a new development opportunity that could be used to fuel the cars of the nursery staff in the municipality. Another municipality (Høje Taastrup) has been creative in using ESCO as a means to reach several political ends. The municipality of Høje Taastrup is first of all one of the Danish 'Climate Municipalities', and ESCO could be seen as one of the first steps to reach the climate goals in 2020. Second, another political aim was to create a better indoor climate in all public buildings, and

ESCO is doing just that. Finally, because of budget constraints, only self-financing projects are to be launched in Høje Taastrup, and ESCO also satisfies this demand. An unplanned spin-off opportunity was that due to ESCO the municipality could afford to upgrade a significant part of their buildings to zero-emission buildings, which would otherwise have had to be postponed. This was possible because of a competent and resourceful staff that as part of ESCO gained an unprecedented knowledge of their building. In conclusion, one might see municipalities on this step as having a more creative 'in-house' grip on the ESCO project, which has made it possible to connect the ESCO project with other strategies. However, none of the referred municipalities have to this date any ambitions of extending the ESCO concept, for instance to include other types of buildings or facilities, or even use the experience to involve private building owners in ESCO arrangements. The reason for this might be that these municipalities are in a time-consuming implementation phase. But also that it is quite resource-demanding to involve homeowners and private parties in such activities.

Step 3: Improvement and innovation – but with some challenges

An example on an innovative approach to ESCO is the municipality of Middelfart, where the successful ESCO-retrofitting of the municipality's building stock has led to a dissemination of the ESCO concept to other areas of the municipal administration. The municipality has tried to 'copy' the functions of an ESCO to also encompass private homeowners' buildings by establishing a network with local and regional actors (energy suppliers, carpenters, plumbers, financing institutions and others) that could offer the homeowners an 'energy-saving package' consisting of a free energy audit of the house (inspired by the energy label) and an offer to implement the initiatives with low payback time. In contrast to a 'real' ESCO, this did not include guaranteed energy savings. The idea was to make homeowners in different neighbourhoods give a collective tender on energy renovations of buildings that are technically similar. In doing this, the municipality took on the role of the explorative leader, a strategy of network governance (Hartley 2005). The advantage of a possible success would have been a heavy reduction of CO₂ emission as well as employment for local business. However, pooling home owners in a rural environment proved more difficult than expected; the network governance may have a reduced effect in rural settings compared with urban areas, maybe because the 'sampling' density of similar buildings varies. Therefore, different concepts for engaging the local homeowners has subsequently been developed and tested. Nevertheless, this initiative and the municipal ESCO are embedded in a vision for the municipality, where the strategy is to build competences amongst the local enterprises for energy renovation, and doing this in networks with other municipal actors. Also, initiatives are being taken to encourage other building owners (for instance social housing associations) to implement energy savings, inspired by the municipal ESCO project.

In conclusion, the municipality of Middelfart has so far been the most innovative municipality, primarily because the municipality learned important lessons from the ESCO, which it afterwards tried to copy by applying a network governance strategy. It is important to note that Middelfart has taken some of the first important steps to think creatively about using ESCO to reduce CO₂ emission in the entire building stock of the municipality, and that one of the drivers in this innovation process was the access to external funding, which provided Middelfart with the resources necessary for experimenting.

Conclusions

Our preliminary studies of the ESCO development in Denmark suggest that ESCO as a concept holds great potential for flexible interpretations, i.e. that it can be formulated and argued in many different ways to fit the local context. What seems as a more or less uniform concept is revealed by a closer look to have many different drivers and logics for the municipalities. This includes issues on financing, on political commitment to pursue energy reductions, on defining the ESCO tender and composing different types of initiatives in buildings, issues on competences and the internal municipal organisation, and the traditions of carrying out public-private collaboration. The flexibility of ESCO might to a large degree decide to which extent the concept will be applied more generally in Danish municipalities.

We observed that the national initiatives for institutional capacity building on ESCO seem to have had limited influence on the municipalities' knowledge of and decisions on ESCO, and have been relatively weak compared with those of other countries. They might however have had an effect on the supply-side amongst ESCO suppliers and consultants, but this has not been studied. The limited institutional capacity building

might have had an influence on the development, but we also observed that the municipalities have collected information on ESCO from other informal sources that have helped them in their decision to take up ESCO contracting. To a large extent, the development in Denmark has benefited from the development in other countries, primarily Sweden, on the supply-side (ESCO suppliers having gained experience from projects in Swedish municipalities), as well as the demand-side (Danish municipalities learning from Swedish municipalities). Compared with the Swedish development, the local commitment to reaching agreed energy savings has been a strong motivation for the Danish ESCOs, along with the mandatory energy labelling being linked to the opportunity for loan-taking for energy renovations.

An interesting issue is raised on completing energy renovations as ESCO projects versus as an in-house project, thus keeping competences within the municipality. Smaller municipalities have limited options for the latter solution, but for large municipalities this might raise a dilemma that defines the future role of the municipal administration; to what extent should municipal competences concern hands-on knowledge on building management, including energy reductions, and to what extent should the competences concern management of out-sourcing, public-private partnerships, networked governance etc.?

Our analysis also suggests that ESCO contracting implies potential for public innovations, as learning taking place in the process can be exploited in different arenas, giving the municipality new roles, for instance as performing network-based governance in relation to local actors outside the municipal administration. We therefore see ESCO not only as an option to pursue goals on energy reductions and maintenance back-log, but also as a way to develop municipal administration in more innovative directions.

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